CHAPTER 2

SOILS
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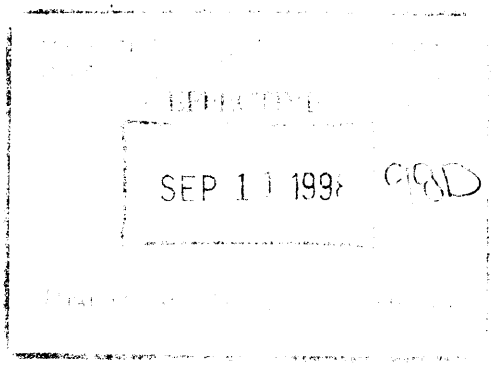

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CHAPTER 2

SOILS

2.10 Introduction

This chapter presents soil resource data and soil mapping for the Crandall Canyon Mine. This information has been compiled from the previously approved Mine Reclamation Plan ACT/015/032 and newly gathered data associated with the approved culvert expansion. Additional soil information from the proposed south portals is also included. Soil studies were conducted in accordance with guidelines issued by the Utah Division of Oil, Gas, and Mining. All surveys fulfilled the requirements established by the Soil Conservation Service (SCS).

The permit area and coal leases are delineated on Plate 1-1. The disturbed area is presented on Plate 5-3. There will be no surface disturbance within the Incidental Boundary Change area. The area is being added to facilitate the extension of underground main entries and will not affect the ground surface or vegetation. There will be no surface disturbance within the South Crandall Lease area nor the U-68082 lease mod area as a result of mining within the lease.

This chapter presents a description of the premining soil resources, feasible use of substitute soils, topsoil and subsoil to be saved, stockpiling of soils, and surveys of the soils.

2.20 Environmental Description

The mine and existing area of disturbance is at an elevation of approximately 7500-7800 feet on a southern exposure with slopes ranging from 5% to 70%. The disturbance associated with the culvert expansionl include the canyon floor and the associated toeslopes. The mean annual soil temperature is 40 to 44 degrees F and the average annual precipitation is 20 to 23 inches.

The soils are classified as Entisols and Mollisols. The Entisols are shallow, found on the steeper slopes and have a moderate to high erosion hazard. The Entisols are classified as poor for the recoverability of topsoil due to the steepness of slope (50-70 percent) and the high percent of large rocks on and in the surface layer (35-60 percent). Recovery of topsoil from these areas is difficult.

The Mollisols are found on more moderate slopes and are deep, well drained soils which have a moderate to low erosion hazard. The Mollisols generally have a deep, well formed A horizon. These soils in general can produce large amounts of topsoil and subsoil that can be removed, stockpiled, and used as good growth medium for reclamation.

2.21 Prime Farmland Investigation

The land within the permit area has not been historically used as cropland nor is the area conducive to intensive agricultural uses. GENWAL contacted SCS in Salt Lake City and obtained a letter of negative determination enclosed as Appendix 2-1 from Mr. T.B. Hutchings Ph.D., SCS State Soil Scientist. There is no prime farmland within the South Crandall lease area nor the U-68082 lease mod area. (Refer to Appendix 2-10)

Also, information from the field survey completed by Valley Engineering was sent to SCS and a letter was received by GENWAL indicating a negative determination for the presence of an alluvial floor. The SCS letter is included with this application as Appendix 2-2. Both of these negative determinations are supported by the findings of Mr. Dean Larson, Soil Scientist with the Price Office of the U.S. Forest Service (Appendix 2-3A).

2.22 Soil Survey

The initial soil survey was conducted by Valley Engineering. Refer to Plate 2-1 for the existing surface disturbance. Accurate soil survey information and productivity data were obtained and are representative of the entire disturbed area (see Appendix 2-3 and Plate 2-1).

A supplemental soil survey was conducted by GENWAL personnel, Chris Hansen of Earthfax and David Steed of EIS in the summer of 1995 and 1996 to assess the undisturbed soils in the area of the culvert expansion project (Plate 2-4). These data have close correlation with and support the findings of the previous soil surveys.

2.22.2 Soil Identification

The "Soil Study" report prepared by Valley Engineering is included as Appendix 2-3 and the "Soil Types Study Map" is included as Plate 2-1. An additional soils study, prepared by the U.S. Forest Service, is included under Appendix 2-3A. The data collected for the approved culvert expansion project are contained in Appendix 2-3B. An additional soil study was prepared by James Nyenhuis for the south portal expansion (see Appendix 2-6). A map is included with this report.

2.22.3 Soil Description

Soil descriptions are found in the "Soil Study" report prepared by Valley Engineering included as Appendix 2-3 and on the "Soils Types Study Map" included as Plate 2-1. Refer to Plate 2-6 for the regional soil classification, including the soils within the South Crandall lease area.

Also, additional soil survey information can be found in Addendum to Appendix 3-2, Synopsis of Riparian Baseline Inventory of Crandall Creek and Review of Baseline Riparian Inventory of Crandall Creek Proposed Crandall Mine Expansion for a more thorough discussion on hydric soils.

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2.22.4 Present and Potential Productivity of Existing Soils

The present and potential productivity of soil within the disturbed area and the approved culvert expansion have been assessed to determine the volume of suitable growth materials and the difference between topsoil and subsoil. The following data have been supplied in Appendix 2-3 and 2-3B: sodium absorption ratio (SAR); electrical conductivity (ECE); saturation percentage; soluble calcium; magnesium and sodium; organic matter content; and lime content. Appendix 2-6 defines the productivity of the soils in the proposed south portal area.

The larger rock fragments encountered during topsoil salvage operations that could damage equipment during loading and transportation operations will be sorted out during salvage operations. Moderate-size fragments will be salvaged with the topsoil and stockpiled. The ECE values are very low in all samples as shown on page 8 of Appendix 2-3 and in Appendix 2-3B. There are no problems with salinity. The SAR values are also very low in all samples, indicating there are no problems with sodium salts, the pH is slightly alkaline which is normal for the area. All samples have some presence of carbonate.

On June 2, 1992, Mr. Larry Johnson and personnel from Environmental Industrial Service inventoried three areas that have interim reclamation. The areas in question are shown on Figure 8a and are listed as Areas 1, 2, and 3 respectively. The purpose of the inventory was to determine the depth of in-place soil and the success of the revegetation. The inventory also indicated that none of the reclaimed areas were topsoil storage sites.

Soil depths were determined utilizing a six foot probe driven into the ground on approximately 5 foot centers. At each test point, the probe was driven in three times in an area approximately 12 inches in diameter at a 90 degree angle to the surface and the depth of soil noted. The maximum depth encountered was then recorded and plotted.

A small portion of Area 1 had soil material to a depth of 24 inches. However, this soil was determined to be insitu soil that had not been disturbed due to its close proximity to an island of undisturbed vegetation. In addition to the reclaimed areas, the soil depths at the two undisturbed areas were also inventoried. Both areas average 39 inches of soil, but included approximately 50% cobble size rock (4 inches to 6 inches in diameter). Thus, this soil would yield less than 18 inches of usable top and subsoil if salvaged. Therefore, the net gain of soil to be utilized in other areas does not appear to justify the destruction of the existing established islands of mature vegetation.

2.23 Soil Characterization

The soil survey was conducted in accordance with the standards of the National Cooperative Soil Survey and with the procedures set forth in the U.S. Department of Agriculture Handbook 436 (Soil Taxonomy, 1975) and 18 (Soil Survey Manual, 1951). In 1992 in conjunction with the acquisition of Lease UTU 68082 a new soils inventory was incorporated into the permit (Appendix 2-3A). In addition, supplemental soil data were collected for the proposed culvert expansion.

2.24 Substitute Topsoil

Topsoil and subsoil were removed in separate layers from all areas subject to surface disturbance except for map unit DPH2 (Plate 2-1). The removal of topsoil was restricted in areas with steep slopes of 30% and greater and in areas with a high percent of large rocks present in the soil profile. The subsoil from the JDE map unit (Plate 2-1) will be used as a topsoil substitute for reclamation of the steep rocky slopes associated with the DPH2 soils. The acreage of DPH2 soils to be reclaimed is 2.39 acres.

2.30 Operation

2.31 General Requirements

2.31.1 Methods for Removal and Storage

All topsoil and subsoil were removed during the construction season of 1982. Actual procedures are not known. Based on the data available, the following suppositions are provided.

The subsoil and topsoil were not stockpiled separately. Topsoil and subsoil were removed in one lift with the depth of topsoil determined by the operator who monitored the soil color. The lift depth varied as shown within the "soil study" report, Appendix 2-1. Topsoil and subsoil were removed and stored in the permanent stockpile location as shown on Plate 2-2. (The four stockpiles located on Plate 2-2 are within the permit area and the disturbed boundary).

The topsoil was removed from the areas indicated on the soil survey map (Plate 2-1) as TCE and JDE, which included the Datino Variant, Jodero Variant and Twin Creek soils, after the vegetative cover was cleared from the areas. A front end loader and a D-6 size dozer were used to remove and load topsoil into haul trucks. A qualified supervisor monitored the topsoil removal and stockpiling operation to insure the protection and preservation of all topsoil material. Each topsoil stockpile was worked with a small Cat D-6 size track dozer to minimize compaction to the stockpile while dressing the stockpile to final design configuration.

The topsoil stockpiles are adjacent to the public access road, as requested by the USFS. The annual and perennial plants that were used to stabilize the topsoil stockpiles for interim reclamation are contained in the seed mixture described in Section 3.30 of Chapter 3.

The topsoil piles were inventoried to attempt to determine the disposition of distribution of topsoil and subsoil. All three storage areas appeared to be made up of similar material with no distinct change in color and/or texture which might distinguish subsoil or topsoil placement. The inventory consisted of minor probing and ocular estimates of the surface only. Due to the well established vegetation and the stability of the piles of soil, a more extensive inventory would serve no purpose other than to damage the integrity of the storage sites.

The pedogenic process will become somewhat restricted for the soils stored in the topsoil stockpiles. The physio-chemical changes that may occur include nitrogen loss, loss of micro biological life forms, the existence of anaerobic conditions within the deeper portions of the stockpiles, and structural breakdown of the soils. These changes will be minimized by avoiding compaction during stockpile construction and by segregating the individual soil units where practical.

Topsoil from the culvert expansion area was salvaged from the area south of the warehouse identified as the north slope area (Map Unit A), the south slope bench area (Map Unit B), and the south slope of the hillside adjacent to the coal pile area (Map Unit C) as shown on Figure 8B. Two additional new areas, shown as Map Unit D and Map Unit E on Figure 8B, were identified for topsoil salvage, during pad construction, in the southwest corner of the mine yard expansion area. Immediately east and contiguous to Unit D is a rocky point that was recontoured during the yard expansion. This area is identified as Map Unit E. Topsoil was removed from this point but because this work was done after most of the topsoil recovery was finished, this volume of material was not included in the soil report prepared by Pat Johnston, the soil consultant who supervised and monitored the topsoil recovery and stockpiling operations during the yard expansion operations. Nielson Construction Project Manager Mark Greenhaulgh oversaw the topsoil removal and stockpiling from this particular area. Approximately 108 cubic yards of topsoil was removed and stockpiled at stockpile #4 from this nose cut area.

Soil was also removed, during the surface expansion project, from two areas, designated as Map Unit G, during the construction project. This soil was collected from a narrow strip along the south side of the road and old loadout site and from the new area that was disturbed when the sediment pond was reconstructed. Approximately 160 cubic yards of topsoil material was removed from these two areas and stockpiled.

No topsoil or substitute topsoil materials was salvaged from the area associated with the stream or streambank or the area of steep slope area on the southern flank of the stream. To preserve the alluvial and residual soils and stream channel in this area, GENWAL covered the insitu stream area with a geotextile fabric prior to placing any backfill during construction. Similarly on the steep slope area to the south of the stream bank a geotextile fabric was placed on the surface before placing any backfill material. During the culvert expansion approximately 2.5 acres of in place topsoil were protected using the geotextile (see Figure 8D). A description of the geotextile used is given in Appendix 2-7. During the south portal construction an additional 0.08 acres of in place topsoil will be protected with geotextile.

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After the lower pad of the Expansion Area was completed to finish grade, the permanent coal storage area was prepared. Topsoil material was removed from Map Unit C (Figure 8B), a small area of the adjacent slope near the location where the southern flank of the coalpile rests against the existing hillside. This topsoil was salvaged under the direction of Pat Johnston, soil scientist, to assure optimum recovery of the soil resource in this area. The soil was stockpiled at topsoil stockpile #4 for storage until it is utilized during final reclamation. Between all salvage areas, about 3,880 cubic yards of topsoil was collected and stockpiled at stockpile #4 for final reclamation. This amount exceeded the original projection of 3,480 cubic yards by 400 cubic yards.

During coal storage and stockpiling activities, coal was pushed up beyond area C onto an area where topsoil had not been stripped. In order to abate violations N98-45-1-1 and N98-45-3-1, GENWAL has removed the coal from the area where topsoil had not been removed on the south slope. (The approximate area is identified as Map Unit F on Figure 8B.) The previously undisturbed topsoil area, which had been covered with coal, was cleaned thoroughly using the best technology available. The topsoil was then removed under the supervision of Pat Johnston, reclamation specialist/soil scientist between August 5- August 18, 1998 and transported to topsoil stockpile #4. The topsoil was removed from the slope area that was and could potentially be affected by the coal stockpile in the future. Approximately 690 cubic yards (69 truck loads) was salvaged from the slope. The visible topsoil depth averaged 3-4 inches over this area but 8-9 inches was actually removed due to the steepness of the slope and the operational constraints of the equipment on the steep slope.

During phase 2 of the surface expansion, three portals will be established on the south slope of the mine yard. The new portals will be constructed along the south side of the upper pad of the existing mine-yard (refer to Plate 5-3). This area is presently serving as the parking lot and material storage yard. The new portals will consist of an intake portal, a fan portal, and a belt portal. The intake portal will be used to accommodate fresh air intake into the mine, and also to provide primary travel access into the mine for employees and materials. The fan portal will support a ventilation fan which will suck return ventilation air out of the mine. The belt entry will be located south of the existing coal pile and will contain the main conveyor belt hauling coal out of the mine.

Construction of the portals will be done within the existing permitted disturbed area boundary. The existing disturbed area boundary will not be increased. The existing sediment pond has been sized to accommodate this new portal construction area, so no changes to the sediment pond

will be required. Except for adding a new culvert under the access ramp to the new portal, none of the previously approved and existing surface drainage structures will be affected.

In the area of the new south portals, the base of the coal seam is located approximately 17' above (i.e., higher than) the level of the existing mine-yard. An earthen ramp will be constructed on the existing pad to gain access up to the level of the coal seam. In the area of the intake and fan portals, the existing hill slope will be excavated with a back-hoe to expose the coal seam in preparation for construction of the portal canopies. A small elevated pad will also be constructed in front of the fan portal on which the mine fan can later be installed. This fan pad will be constructed as a continuation of the access ramp leading to the intake portal. The access ramp to the intake portal and the fan pad will be constructed partially using the earthen material generated in the process of facing up the coal seam and partially using fill material hauled in from an off-site borrow source. (See Appendix 2-8 for laboratory analysis of the native fill and the imported fill) The imported fill material will come from the same source (i.e., the same borrow pit) that supplied the pad material for the recently completed surface expansion. This borrow site would be the Nielson Construction commercial borrow pit located in Huntington Canyon below the power plant. The source of fill material has been determined to be free of noxious weeds (see Appendix 2-9). As the access ramp is being constructed a new culvert (C-11A) will be added to handle sheet flow drainage from the upper material yard (see Plate 7-5). It is estimated that approximately 3500 cubic yards of fill will be needed to construct the access ramp/fan pad. This quantity will be verified after construction on the as-built plans.

As the access ramp and fan pad are constructed from the existing yard surface up to the level of the coal seam outcrop, some of the new fill material will be placed up against the intervening existing undisturbed slope. Part of the access ramp/fan pad will therefore be constructed on top of the existing slope. Before this ramp/pad is constructed, topsoil along the existing slope below the fan pad and access ramp will be protected in-place using a geotextile cover placed along the undisturbed slope under the fill material. This topsoil protection technique would be identical to the approved method used during construction of the existing surface expansion facilities (Phase I surface expansion). It is estimated that approximately 3366 square feet (0.08 acres) of in place soil will be protected by geotextile during construction of the south portals. A description of the geotextile to be used is given in Appendix 2-7.

After the access ramp and fan pad have been constructed (and the underlying in-place topsoil protected with geotextile), the portal excavation can begin. Prior to starting the portal cuts, the existing topsoil at the portal sites will first be salvaged. Topsoil conditions along the south slope portal area is similar to the conditions at the adjacent coal pile area where topsoil was salvaged during August, 1998. This topsoil salvage effort is described in appendix 2-5, Part II, prepared by Pat Johnson, soil scientist. At that area, according to Ms. Johnson's report, the depth of true topsoil was 3" but an average of 8" - 9" of material was taken due to the operating nature of the backhoes which were employed in the salvage process. In addition, an intensive soil inventory and site investigation was performed on the south slope on August 18, 1998 and is included in Appendix 2-6.

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In order to minimize the area of additional disturbance associated with the construction of the south portals these portals will be constructed by excavating individual pockets into the hillside for each portal rather than along a common highwall. By utilizing individual pocket cuts for the portals the total area of new disturbance is expected to be less than 4500 sq. ft. (0.11 acres). Topsoil will be removed from the areas of the south portal pocket cuts prior to excavation as described in Section 2.31.1. According to the Nyenhuis survey, the upper 2 feet (24 inches) is suitable for salvage. Based on the Nyenhuis soil survey it is anticipated that approximately 9000 cu. ft. (333 yds.) of topsoil will be salvaged from the intake and fan portal cuts.

The salvaged topsoil will be stored on the existing topsoil pile #4 located off-site at the bottom of Crandall Canyon. This topsoil pile is constructed on Forest Service land under a Special Use Permit issued on 8/17/87. This pile #4 was originally constructed in 1997 curing Phase 1 of the surface facility expansion. At that time it was designed and constructed sufficiently large to accommodate the additional topsoil storage requirements for the Phase 2 south portal construction. The Forest Service has concurred with the addition of the south portal topsoil to this pile. All topsoil removal, salvage and storage will be over-seen, directed and monitored by an independent soils scientist approved by the Division. A report of the topsoil salvage operation will be prepared by the soil scientist and added to the MRP upon completion as Appendix 2-5, Part III.

After the portal sites have been faced up construction of the portal canopies will begin. These canopies will be constructed from steel I-beams and plate according the MSHA guidelines. The canopies will be anchored to concrete footers. These canopies will provide a safe structure from which the miners can begin driving the entries back into the coal seam. After the intake and fan entries have been driven into the hillside and connected together underground with a cross-cut, work can then be started on construction of the mine fan installation. While the fan is being installed, the miners will drive the belt entry from inside the mine out to the belt portal. During this phase of development, mined coal will be moved away from the surface with a front-end loader, a mobile radial stacker, or some other temporary means of conveyance. After the belt portal connection is completed, a new conveyor truss will be installed from a concrete landing at the belt portal out to the existing coal pile. All coal from the mine will then be delivered directly to the existing coal pile and will be crushed and loaded on trucks through the existing coal handling facilities.

Power, water, communications, and other mine infrastructure will be supplied to the south portals as an extension of the pre-existing Crandall Canyon Mine facilities.

Figure 5-11 depicts a typical cross-section through the south portals, showing the pocket cut, access ramp, lu-situ soil geotextile protection, and the portal canopy construction.

Plate 5-3 depicts that area of the south slope where the portals are proposed to be located during phase 2 expansion in mid-1999. Plate 5-3 also shows the cut slope disturbance in the southwest portion of the mine yard. The topography for this portion of the mine yard has been revised to reflect the as-built configuration. A side canyon drainage channel conveying undisturbed area runoff to the main Crandall Creek channel forms the western boundary of the mine yard in this area. Rip rap for the culvert inlet headwall was installed on both sides of the channel farther up the embankments than depicted on the proposed construction map. This additional rip rap was added
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to protect the main culvert inlet from erosion due to the side canyon drainage. Rip rap was added to the side channel to increase the integrity of the channel and to prevent the channel embankment from eroding thus allowing undisturbed drainage to enter the mine yard area. The same rip rap specifications used for the main undisturbed drainage inlet culvert and headwall were also used for armoring the side channel.

GENWAL is also considering a second possible option for constructing the south portal intake and fan portals. Instead of constructing a ramp up to the level of the coal seam, short tunnels would be driven from the existing yard level up to the coal seam. In this scenario the pocket cuts would be be made into the hillside lower down at the same level as the existing pad. This level is approximately 15' below the base of the coal seam. Since the coal seam sits directly on top of the Star Point Sandstone, this sandstone out-crops at the existing yard level. Tunneling would begin in the sandstone and ramp up underground to the coal seam.

If the tunnels are driven at an incline of 10% they will be about 160' long to where they intersect the base of the coal seam. At 8' high and 20' wide, excavation of the two tunnels (intake and fan) would generate approximately 1900 cu yds. of material during construction. This tunnel excavation material will consist of sandstone mixed with coal. This excess material would be disposed of by placing it in a 6' deep layer along the existing fill bank located between the upper material yard and the coal storage pad. This embankment is part of the designated coal storage area and currently is covered with coal. Therefore, after the tunnel excavation material is layered onto the embankment, it too will be covered over by the active coal pile for the remaining life of the mine. Refer to Figure 13-a and 5-13b for more details of this tunneling construction option.

Upon final reclamation the tunnel excavation material would be hauled back into the mine tunnels where it would be sealed up prior to backfilling the portals. Backfilling and reclamation of the portal pocket cuts would be the same regardless of whether the ramp or tunnel option is selected. If GENWAL elects the tunnel construction option, topsoil will be salvaged in exactly the same manner as described previously. The amount of topsoil salvaged, stored and redistributed would be the same regardless. If the tunnel option is selected, there would be no additional in-place topsoil required to be protected with geotextile, because there would be no fill material placed up against the hillside.

If this option is selected, GENWAL commits to ensuring the protection of the hydrologic balance for surface and groundwater systems as required by R645-301-731. The tunnel excavation material will be tested for acid- and toxic-forming material and the analytical results of this testing will be presented to the Division. The hydrologic balance will be protected in the following manner.

a) The excavation material will consist of fragmented Star Point sandstone. This sandstone

outcrops naturally in the minesite area and is one of the major geological features which determine the character of Crandall Canyon and many other canyons in the Wasatch Plateau. This predominant sandstone is not known to be acid- or toxic-forming anywhere in the Utah coalfields. However, further site-specific testing of the sandstone will be conducted prior to any construction.

b) The proposed location of the material storage is on top of the existing pad fill. Any runoff from this area would report to the existing sediment pond.

c) The existing pad fill in the proposed storage area varies between 10' and 40' thick over the bypass culvert and is densely compacted. This thickness of compacted fill material is sufficient to preclude any leaching downward into the bypass culvert or groundwater.

2.31.2 Analysis of Topsoil Substitute

The soil survey and chemical analysis for the proposed topsoil substitute have been completed. A portion of the B horizon of the TCE soil was salvaged and stockpiled along with that from the JDE to insure that an adequate supply of plant growth medium will be available for reclamation of the steep slopes (50 to 70 percent).

2.31.3 Topsoil Evaluation

Testing plans for evaluating the results of topsoil handling are discussed within Section 2.42 of this chapter. Nutrient and soil amendments will be added based on the results of these tests. Sampling techniques are discussed in Section 2.41.

Five years prior to beginning reclamation operations, GENWAL will consult with the Division to re-evaluate the techniques and practices being proposed in the reclamation plan (Appendix 5-22). This consultation will include forming a task force of members with various areas of reclamation expertise to review the reclamation plan and recommend the best and most suitable reclamation techniques and products available at that time. The review and consultation will re-assess and revise, where needed, the existing reclamation plan to provide the best and most appropriate reclamation measures for the site.

2.31.4 Stockpiles

The volume of each stockpile is included on Plates 2-2, 2-2a and 2-5 as well as in Section 2.42 of this application. See Appendix 2-4 for the justification and rationale for 6" topsoil redistribution.

The topsoil stockpiles are protected from erosion, compaction, and contamination. An earthen berm and asphalt berm in combination with strawbale dikes have been constructed to protect against topsoil loss and the stockpiles have been revegetated with an approved vegetative cover.

The cross sectional views of the topsoil and subsoil stockpiles are included on Plates 2-2, 2-2A, 2-3, 2-5, 2-5A and 2-5B. Stockpile #4 will be used for the salvaged materials from the culvert expansion area, and the design is shown on Plates 2-5, 2-5A and 2-5B. GENWAL has submitted Plate 2-3 showing the location of the topsoil stockpiles with respect to the surface facilities. Topsoil identification and protection markers are installed. The perimeter and topsoil markers conform to UDOGM regulations.

Stockpile #4 will be constructed with topsoil removed from the surface expansion project. The stockpile will be located across the road and north of stockpile #3. This location was previously surveyed for cultural resources by Forest Service archeologist, Barbara Blackshear. No cultural resources were located. Soil survey information for this area is presented in Appendix 2-3A.

The pile area will accomodate approximately 5,000 cubic yards of soil material with sideslopes on a 3:1 slope and a top elevation of 6,997'. Approximately 4,756 cubic yards of material were salvaged from the surface expansion area. Approximately 333 cubic yards of additional material is expected to be salvaged from the south portals. Refer to Plates 2-5, 2-5A and 2-5B for design detail. These plates will be updated in the MRP to reflect the as-built configuration after construction of the south portals is complete.

The topsoil and substitute topsoil materials are stored in Stockpile #4 and will be protected from erosion by a vegetative cover. Upon placement and configuration of the topsoil stockpile, two tons per acre of organic mulch and an approved seed mix was applied at the specified rate approved by the Division. The mulch and seed was applied to the topsoil stockpile in the early fall of 1997. Silt fence was placed around the perimeter of the pile.

2.32 Topsoil and Subsoil Removal

All topsoil and subsoil, associated with the initial disturbance, were removed during the construction season of 1982. The volumes of salvaged topsoil and subsoil, included in Section 2.42, is 9,219 bank cubic yards. The topsoil was stored in four locations as shown on Plates 2-2, 2-2a, 2-3, and 2-5. The topsoil associated with the proposed culvert expansion will be removed and stockpiled according to approved plans. Areas showing soil removal are shown on Plate 2-4 and Figure 8B; and the stockpile area is shown on Plates 2-3 and 2-5.

2.33 Topsoil Substitute and Supplements

Section 2.24 and 2.42 of this chapter address the substitute topsoil soils and their perspective locations.

2.34 Topsoil Storage

All topsoil and subsoil from the initial disturbed area were removed and stored during the construction season of 1982. The volumes of salvaged topsoil and subsoil are included in Section 2.42 of this chapter. The topsoil was stored in four locations as shown on Plates 2-2, 2-2a, 2-3, and 2-5. Sections 2.31 and 2.42 of this chapter address the topsoil storage and location of the topsoil piles.

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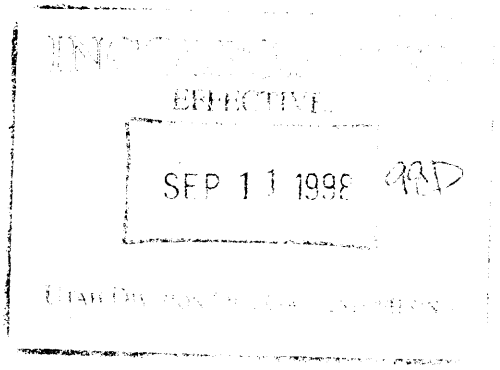
2.40 Reclamation Plan

2.41 General Requirements

The permit application includes plans for redistribution of soils, use of soil nutrients and amendments and stabilization of the redistributed soils.



2.42 Soil Redistribution

The soil redistribution volumes are presented in the table below for the 13.6 acre surface facility site and 1.40 acre topsoil stockpile areas. (Refer to Figure 8C.)

AREA IDENTIFICATION	ACREAGE	DEPTH	VOLUME
Original Surface Facilities Area			
Portal Area	0.90 acres	12"	1,452 CY
Shop Area	1.09 acres	12"	1,759 CY
Old Substation Area	0.40 acres	12"	645 CY
Old Loadout Area	2.11 acres	12"	3,404 CY
Subtotal	4.50 acres	12"	7,260 CY
Expansion Area			
North Slope Area	0.14 acres	16"	300 CY
S. Slope Bench Area	0.49 acres	16"	1,051 CY
Coal Pile Area	0.41 acres	12"	662 CY
SW corner of mine yard	0.28 acres	12"	452 CY
Nose cut area	0.11 acres	12"	178 CY
Upper coal pile area	0.15 acres	12"	242 CY
Loadout/pond area	0.22 acres	12"	355 CY
South Portals	0.11 acres	16"	236 CY
Subtotal	1.91 acres	12"/16"	3,477 CY
Total Topsoiled Area	6.41 acres		10,737 CY

Areas Not Topsoiled

Forest Service Road	0.53 acres
Forest Service Trail Head	0.30 acres
Topsoil Storage Areas	1.40 acres
Interim Reclamation Areas	0.78 acres
Undisturbed Areas - N. Side	0.48 acres
Unaffected Area Culvert Inlet	0.50 acres
South Slope Area	2.50 acres
Undisturb. South Area	1.89 acres
Area East of Old Loadout	0.22 acres
Subtotal	8.60 acres
TOTAL AREA	**15.01 acres**

Revised 4/05/2003

The 1.40 acres comprising the four topsoil/subsoil locations will not require soil redistribution since the native topsoil is still in place. The USFS access road and trailhead area will be left intact removing an additional 1.47 acres from reclamation requirements. On the south slope of the Expansion Area, where the fill will be placed to create the coal stockpile yard, the topsoil has been left inplace and protected by geotextile fabric. This area will not have any additional soil material placed on it during final reclamation. Topsoil material recovered from this area will instead be dedicated to reclaiming the original mine yard area and area adjacent to the road. On the south slope area adjacent to the permanent coal storage area, topsoil will be removed from a small area of the adjacent slope near the location of the future stacking tube where the southern flank of the coalpile will rest against the existing hillside. This topsoil will be salvaged under the direction of a soils scientist to assure optimum recovery of the soil resource in this area. The soil will be stockpiled off-site at an approved storage location until it is re-used during final reclamation.

The topsoil requirements will be met from the following areas:

SOIL	ACREAGE	VOLUME	DEPTH
Stockpile 1 (JDE & TCE)	0.20	943 cy	NA
Stockpile 2 (JDE & TCE)	0.20	1087 cy	NA
Stockpile 3 (JDE & TCE)	0.50	3709 cy	NA
Stockpile 4 (Additional)	0.50	2052 cy	NA
Stockpile 4 from coal storage area, Summer 1997 (Areas A, B, C, D, E & G)		4,066 cy	
From coal storage area, August 1998 (Area F)		690 cy	
From South Portals		333 cy	
From Forest Service Trailhead		32 cy	
TOTAL		**12,912 cy (previously 9,519)**	

The subsoil material has been chemically and physically analyzed, to allow for the suitability determination as a plant growing media (Appendix 2-3). The subsoil was removed from the JDE and TCE areas outlined on Plate 2-1 (see Plate 5-3 for surface facilities).

Topsoil and subsoil of the JDE soil type are stored at the above referenced four locations (Plates 2-2, 2-2a and 2-3). Topsoil stockpiles are a mixture of soil types JDE and TCE. The soil types were not segregated during placement in the existing topsoil stockpiles. Topsoil piles will be maintained in their present location and condition until approval is received from the Division for redistribution.

Topsoil will be redistributed with a small, tracked, front-end loader and a D-6 (or smaller) size dozer or a backhoe. The disturbed areas will be ripped prior to topsoil redistribution. A qualified supervisor will monitor the topsoil redistribution operation. The monitoring will ensure even distribution of the topsoil. To minimize compaction of the topsoil, after redistribution, the topsoil will be disced and/or harrowed on the contour where slopes safely allow. Any reclaimed areas that exhibit rills and gullies in excess of six inches will be regraded and seeded.

In that area where the entire soil horizon has been covered with geotextile fabric, the fill material will be removed in 5-10 foot lifts exposing the marker soil and geotextile fabric on an increment of the south slope. After the marker soil has been carefully removed, the geotextile fabric will be peeled away from the surface of the slope. The soil will then be sampled randomly to determine what amendments might be needed. Soil amendments such as fertilizer or PAM (polyacrlimide) would be applied. After the appropriate amendments have been added, the surface would be broadcast seeded. The seed would be hand raked into the soil surface. A wood fiber mulch would then be sprayed over the seeded soil surface. Bonded fiber tackifier will be sprayed over the mulch to hold it in place. Reclaiming the south slope in 5-10' vertical increments, as the yard fill is being removed, will allow better access to the slope for hand work such as seeding, raking and mulching and also minimize soil disturbance and exposure to erosion.

If possible, the topsoil will be redistributed in the late fall (late September or early October) just prior to the seeding time which will provide a seedbed free of weeds and annual grasses. Any weeds and annual grasses which become established before seeding, will be removed before seeding is attempted. Seeding will be done as soon as possible after the seedbed is prepared, but not prior to October lst. If seeding cannot be done within 30 days of topsoil redistribution, the Division will be notified.

No borrow areas will be required to supplement the volume of topsoil or substitute topsoil for redistribution. Due to the limited space within the disturbed area, the subsoil, which will serve as a topsoil substitute, has been stored in topsoil stockpiles as shown on Plate 2-3.

No terracing will be done. All final grading and preparation of overburden before replacement of topsoil will be done along the contour to minimize erosion and instability. See Chapter 5, Section 5.40 for further information.

Initial data indicated that the coal may have had an acid forming potential. However, more recent data (overburden and underburden samples from three in-mine locations and coal channel samples from three in-mine locations) indicate that the material is neither acid-forming or toxic. The chemical analysis of the coal and overburden may be found in Appendix 6-2. The applicant has provided the results of chemical analysis for overburden (soils) on pages 8 and 10 in Appendix 2-3. Accumulated waste from the sediment pond will be analyzed for the acid and toxic forming constituents as defined in Section 5.28.30, prior to either onsite or offsite disposal.

All coal will be removed from the site as saleable product prior to reclamation. The toxicity of the material below the coal stockpile will be tested prior to soil redistribution and treated as necessary. No underground waste will be stored on the surface which would require a plan to be submitted for treating an acid and/or toxic material.

Postmining topographic views of the disturbed area are shown on Plates 5-16 and 5-17. The contour map shows the final surface configuration of the permit area which can be used in conjunction with the premining surface configuration map.

Recontouring

All areas affected by surface operations will be graded and restored to a contour that is compatible with the natural surroundings and post mining land use. For approximate contours prior to surface disturbance refer to the maps presented as Plates 3-7, 3-8, and 3-9.

Removal or Reduction of Highwall

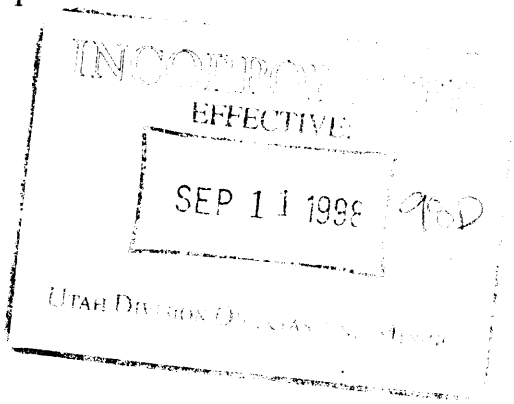
See Chapter 5, Engineering, Section 5.40, Reclamation Plan.

2.43 Soil Nutrients and Amendments

GENWAL has committed to adding nutrients as determined by lab analysis conducted on topsoil samples after redistribution and during final reclamation. The methods used to ensure adequate and representative samples from different locations and depths within the topsoil stockpile used for lab analysis are presented below. Amendments will be added to the soil according to "Soil Survey" recommendations (See Appendix 2-3).

Two soil samples per acre of redistributed topsoil will be submitted to the lab for assessment of nutrient requirements. All lab work will be conducted by a qualified laboratory using methods approved by the Division. The samples will be collected by auger with each auger sample taken on the correct angle to the slope. Results of the samples, along with consultation from the regulatory authority, will determine the necessary nutrients and amendments to the topsoil.

Nutrients and soil amendments, if shown to be required by soil tests shall be applied to the redistributed topsoil layer by broadcast methods and tilled into the topsoil (if required). One ton per acre of alfalfa or straw mulch will be incorporated into the redistributed topsoil and substitute topsoil for increased fertility and physical structure enhancement (separate and distinct from the wood fiber mulch used as a surface mulch described in Section 2.44). No other mitigation plans are proposed for the soil resources except for the addition of nutrients to the topsoil and subsoil after redistribution during the reclamation process.



2.44 Soil Stabilization

Before the topsoil is redistributed, the area to receive topsoil will be regraded and ripped to ensure positive contact and minimize slippage between the existing surface and the redistributed topsoil. The regraded area will be disced on slopes of less than 20% and scarified with a trackhoe on slopes greater than 20% until the grade becomes impractical for the equipment to operate. Topsoil will be redistributed in a manner that achieves an approximate, uniform stable thickness on a surface that will prevent excess compaction of the topsoil. The topsoil will be protected from wind and water erosion before and after it is reseeded. It is proposed that the topsoil will be redistributed with a front end loader and D-6 size dozer. Surface roughening techniques, such as gouging or deep pocking, will be used on the soil surface to minimize compaction and promote water harvest and conservation.

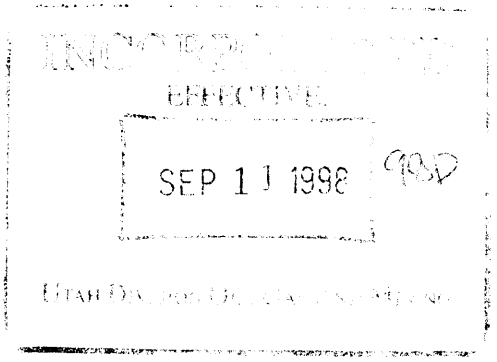
On slopes of 30% and less a wood fiber mulch of 1.5 tons per acre will be used which will be bonded with the soil using a tackifying agent. However, the steeper slopes south of Crandall Creek will treated with a PAM chemical soil treatment to enhance moisture retention and relieve compaction. Then, the seed would be broadcast and hand raked into the soil surface. A soil innoculation treatment may also be incorporated into the soil to aid the re-establishment of soil bacteria, microhorizia and mycelium. Wood fiber mulch will be sprayed over the seed bed and then a bonded fiber matrix tackifier will be applied.

2.50 Performance Standards

All topsoil, subsoil and topsoil substitutes or supplements will be removed, maintained and redistributed according to the plan given under R645-301-230 and R645-301-240.

2.52 Stockpile Maintenance

All stockpiled topsoil, subsoil and topsoil substitutes or supplements will be located, maintained and redistributed according to plans given under R645-301-230 and R645-301-240. Stockpiled topsoil will be protected through a combination of berms, vegetative cover, strawbale dikes and/or silt fences. In addition, those piles adjacent to the main access road that could be impacted by salt used in ice removal will be closely monitored to determine if the vegetation is adversely impacted. In the event damage is in evidence, salt use will be suspended in those areas adjacent to topsoil piles.



CHAPTER 2

FIGURES

TABLE 2-1

SOIL REMOVAL VOLUMES

SOIL REMOVAL AREA ACROSS CREEK					SOIL REMOVAL AREA BELOW WAREHOUSE					TOTAL SOIL REMOVED
LAYER	AREA	DEPTH	VOLUME BCY	CUMULATIVE BCY	LAYER	AREA	DEPTH	VOLUME BCY	CUMULATIVE BCY	CUMULATIVE BCY
0	9877				0	4845				
		1	356	356			1	180	180	536
1	9362				1	4886				
		1	337	694			1	182	362	1056
2	8855				2	4926				
		1	319	1012			1	182	544	1556
3	8357				3	4901				
		1	300	1313			1	181	725	2038
4	7868				4	4875				
		1	283	1595			1	180	905	2500
5	7387				5	4848				
		1	265	1860			1	179	1084	2944
6	6915				6	4821				
		1	248	2108			1	178	1262	3370
7	6451				7	4790				
		1	231	2338			1	177	1439	3777
8	5997				8	4763				
		1	214	2552			1	176	1615	4167
9	5554				9	4732				
		1	198	2750			1	175	1789	4539
10	5124				10	4701				

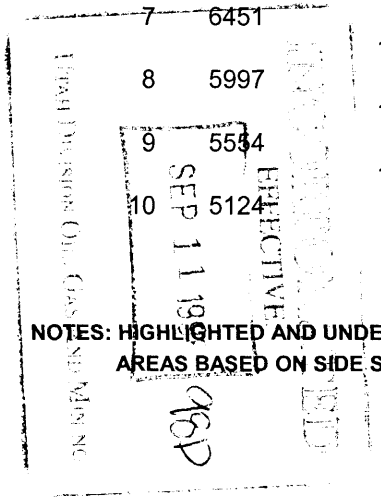
NOTES: HIGHLIGHTED AND UNDERLINED DEPTH INDICATES THE PROBABLE MAXIMUM VOLUME TO BE REMOVED; THE SOIL PITS WERE 4.5' AND 3.3' DEEP RESPECTIVELY
AREAS BASED ON SIDE SLOPES OF 1 TO 1 FROM SURFACE LIMIT

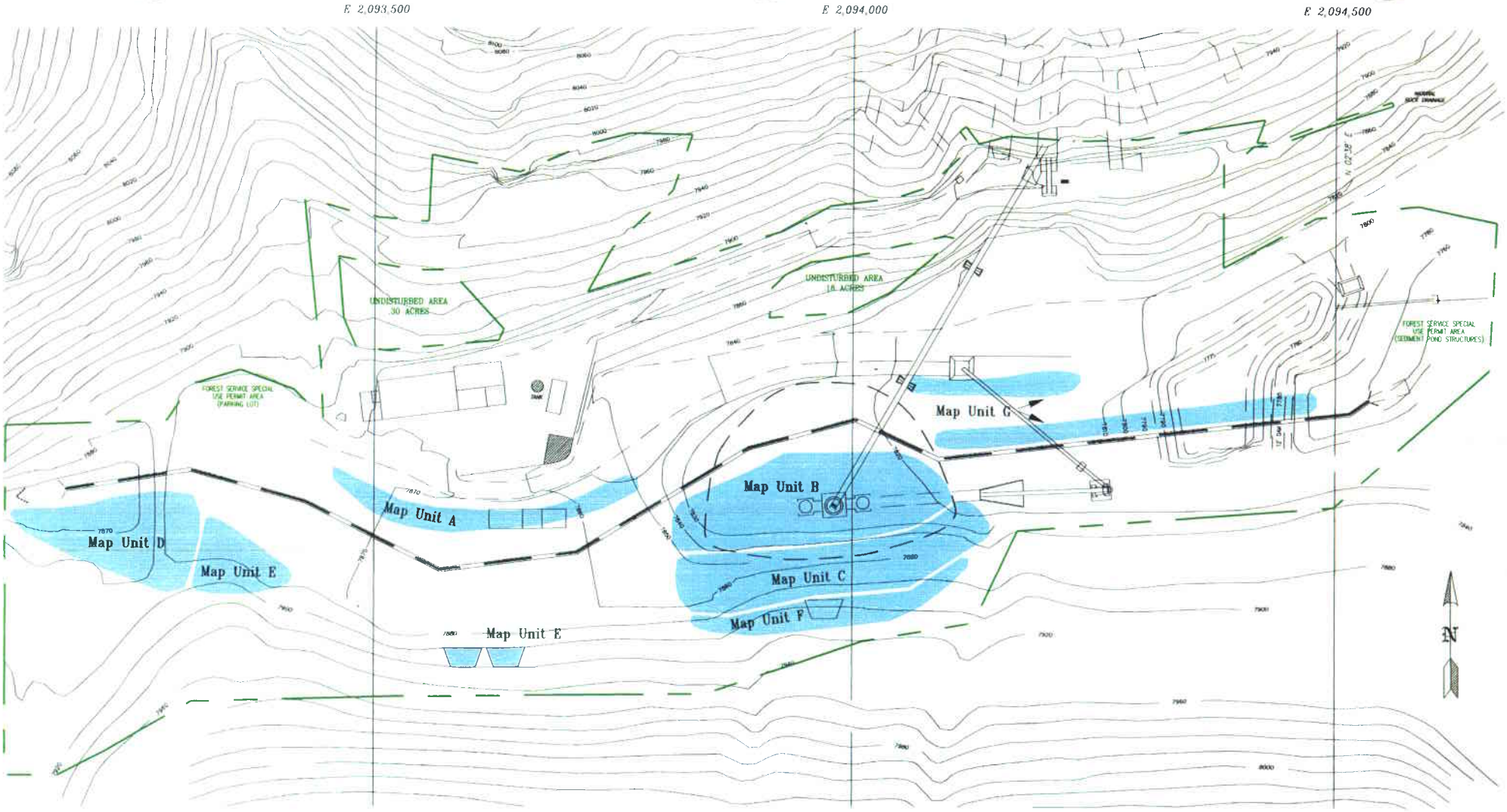
TABLE 2-1

SOIL REMOVAL VOLUMES

SOIL REMOVAL AREA ACROSS CREEK					SOIL REMOVAL AREA BELOW WAREHOUSE					TOTAL SOIL REMOVED
LAYER	AREA	DEPTH	VOLUME BCY	CUMULATIVE BCY	LAYER	AREA	DEPTH	VOLUME BCY	CUMULATIVE BCY	CUMULATIVE BCY
0	9877				0	4845				
		1	356	356			1	180	180	536
1	9362				1	4886				
		1	337	694			1	182	362	1056
2	8855				2	4926				
		1	319	1012			1	182	544	1556
3	8357				3	4901				
		1	300	1313			1	181	725	2038
4	7868				4	4875				
		1	283	1595			1	180	905	2500
5	7387				5	4848				
		1	**265**	**1860**			**1**	**179**	**1084**	**2944**
6	**6915**				**6**	**4821**				
		1	248	2108			1	178	1262	3370
7	6451				7	4790				
		1	231	2338			1	177	1439	3777
8	5997				8	4763				
		1	214	2552			1	176	1615	4167
9	5554				9	4732				
		1	198	2750			1	175	1789	4539
10	5124				10	4701				

NOTES: HIGHLIGHTED AND UNDERLINED DEPTH INDICATES THE PROBABLE MAXIMUM VOLUME TO BE REMOVED; THE SOIL PITS WERE 4.5' AND 3.3' DEEP RESPECTIVELY
AREAS BASED ON SIDE SLOPES OF 1 TO 1 FROM SURFACE LIMIT





SOIL SALVAGE AREAS

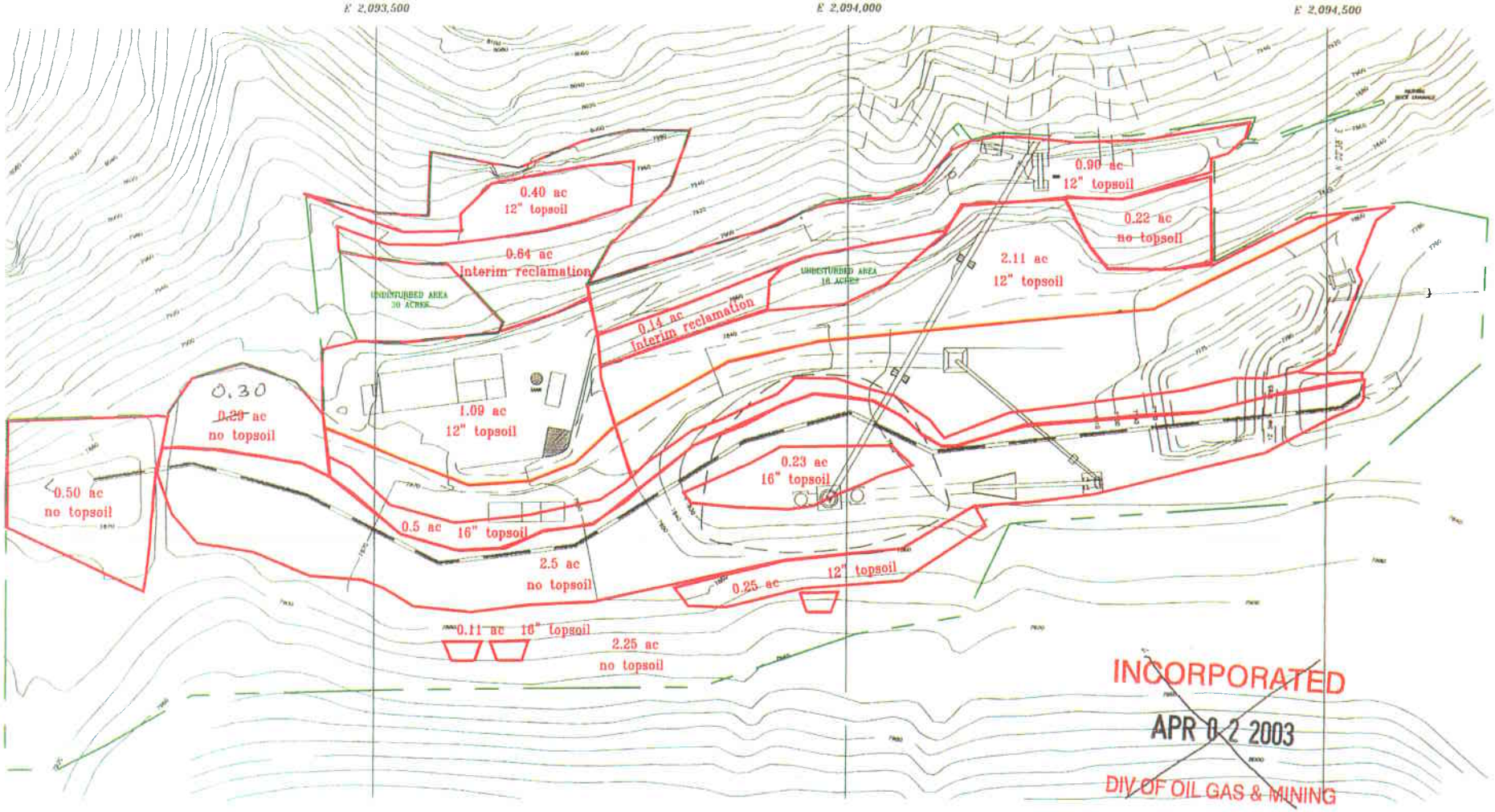
		Acreage	Volume
Map Unit A	(N. Slope Area)	0.14 ac	180 yd.3
Map Unit B	(S. Slope Bench Area)	0.49 ac	1,728 yd.3
Map Unit C	(Coal Pile Area)	0.41 ac	
Map Unit D	(SW corner of mine yard)	0.28 ac	1,872 yd.3
Map Unit E	(Nose cut area/south portals)	0.22 ac	441 yd.3
Map Unit F	(coal pile area)	0.15 ac	690 yd.3
Map Unit G	(loadout/pond area)	0.22 ac	178 yd.3

02/20/03

FIGURE 8B SOIL SALVAGE AREAS

Scale: 1" = 150'

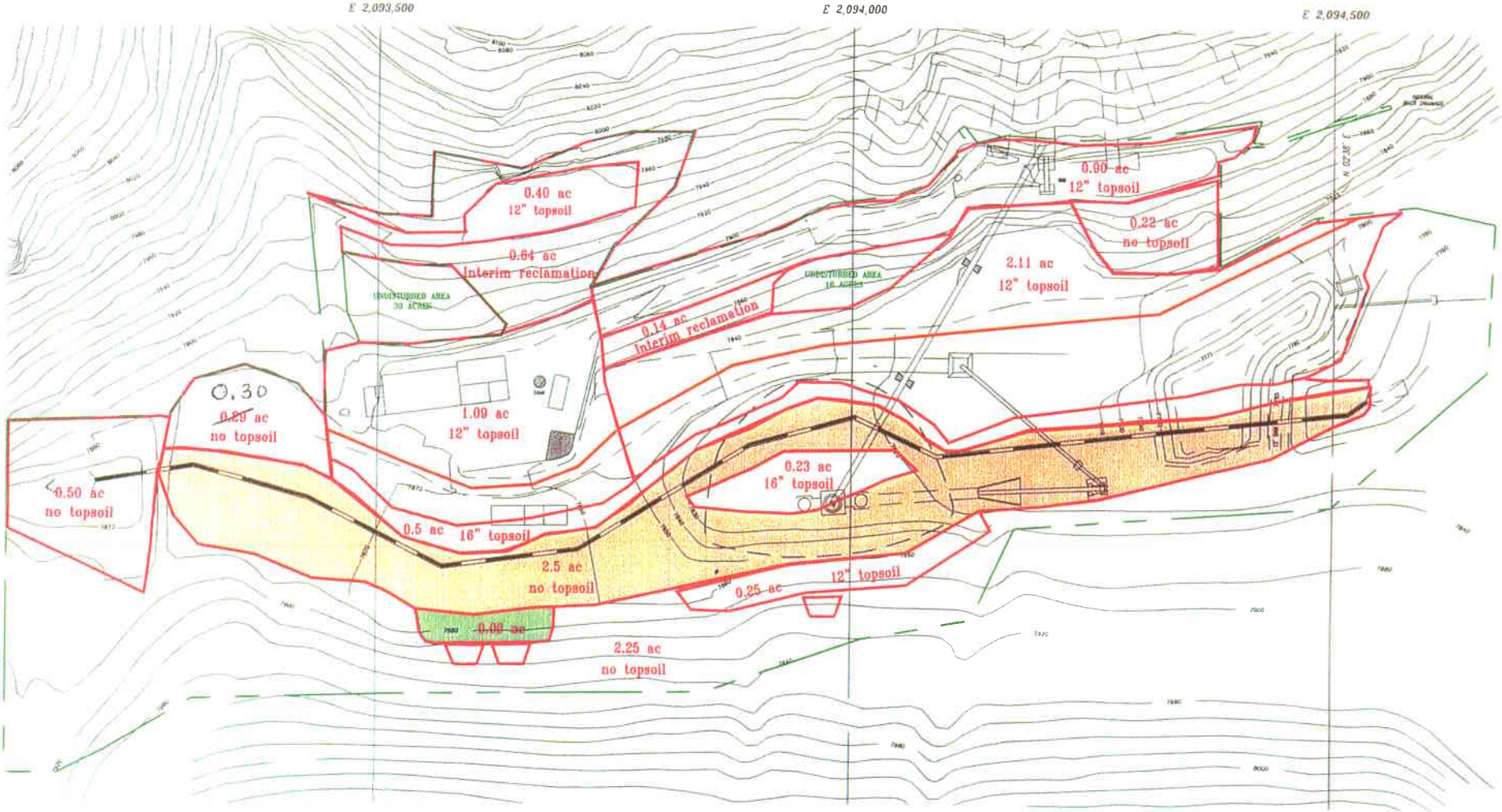
Acad Ref: FIG-8B.dwg



12" Topsoil		16" Topsoil		No Topsoil	
Shop Area	1.09 ac	N. Slope Area	0.50 ac	FS Road	0.53 ac
Old Loadout Area	2.11 ac	S. Slope Bench Area	0.23 ac	Trailhead	0.29 ac
Portal Area	0.90 ac	South Portals	0.11 ac	Topsoil Storage	0.90 ac
Old Substation Area	0.40 ac			Interim Reclamation	0.78 ac
Coal Pile Area	0.25 ac			Undisturbed Areas – N. Side	0.48 ac
				Undisturbed Area Culvert Inlet	0.50 ac
				South Slope Area	2.50 ac
				Undisturbed Expan. Area	2.00 ac
				Area East of Old Loadout	0.22 ac

FIGURE 8C
SOIL REDISTRIBUTION AREAS

Acad Ref: soilare.dwg



12" Topsoil

16" Topsoil

No Topsoil

N

FIGURE 8D
SOIL AREAS PROTECTED BY GEOTEXTILE

Proposed South Portals

Culvert Expansion

Acad Ref: Fig 8D.Dwg